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09/945,508	08/30/2001	Kei-yu Ko	MI22-2037	2656

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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 02/27/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/945,508

Applicant(s)

KO, KEI-YU

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-6,9-11,14-16,19,20 and 65-74 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

- 5) ☐ Claim(s) ____ is/are allowed.

- 6) ☒ Claim(s) 1,4-6,9-11,14-16,19,20 and 65-74 is/are rejected.

- 7) ☐ Claim(s) ____ is/are objected to.

- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.

- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. ____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)

- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.

- 5) ☐ Notice of Informal Patent Application (PTO-152)

- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. (US 5,908,320) in view of Kuehne et al. (US 6,372,605 B1).

Chu teaches an etchant gas composition comprising:

an inert gas (same as carrier gas), (column 6, lines 44-48);

C₄F₈, (column 6, lines 55);

CH₂F₂ (column 6, lines 55); and

a gas selected from the group consisting of CHF₃, CF₄, and mixtures thereof (column 6, line 44-45).

Chu differs in teaching C₄F₆.

Kuehne teaches other suitable gases can be substituted for the C₄F₈, include (for example and without limitation) C₅F₈, C₄F₆, or a combination of C₄F₈ and CH₂F₂ (column 6, lines 44-52).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu by substituting C₄F₈ for C₄F₆ as taught by Kuehne for the purpose of selectively etching a silicon oxide layer relative to a silicon nitride layer (column 6, lines 55-60).

3. Claims 4, 5, and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. ('320) in view of Kuehne et al. ('605 B1), as applied to claim 1, above, and further in view of Kim et al. (US 6,362,109).

Chu in view of Kuehne differs in failing to teach the etchant composition comprises the carrier gas that is selected from the group consisting of argon, helium, and xenon, **in claim 4** and argon **in claim 5**, and comprises O₂, **in claim 65**.

Kim teaches an etchant comprising a fluorocarbon and oxygen with a flow of an inactive diluent gas such as argon is well known for etching holes in oxide with high aspect ratios, often with a relatively high selectivity to nitride (column 4, lines 43-46).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu in view of Kuehne by employing an etchant that contains oxygen in additional to a fluorocarbon gas and diluent gas, as taught by Kim for the purpose of selectively etching an oxide layer relative to a nitride layer (column 4, lines 43-46).

4. Claims 67 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) and Kuehne ('605 B1) in view of Kim (109 B1), as applied to claim 1, above, and further in view of Fayfield et al. (US 6,065,481).

Chu and Kuehne in view of Kim differs in failing to teach the carrier gas comprises helium, **in claim 67** and xenon, **in claim 71**.

Fayfield teaches, "... other carrier gases inert to the etching reaction may also be used, for instance the noble gases helium, neon, argon, krypton or xenon (column 6, lines 17-19).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu and Kuehne in view of Kim by replacing the carrier gas with either argon, helium, or xenon, as taught by Fayfield for the purpose of diluting the reactive (etchant) gases.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) in view of Kuehne ('605 B1).

Chu teaches an etchant gas composition comprising:

an inert gas (same as carrier gas), (column 6, lines 44-48);

C₄F₈, (column 6, lines 55);

CH₂F₂ (column 6, lines 55); and

a gas selected from the group consisting of CHF₃, CF₄, and mixtures thereof (column 6, line 44-45).

Chu differs in teaching C₄F₆.

Kuehne teaches other suitable gases can be substituted for the C₄F₈, include (for example and without limitation) C₅F₈, C₄F₆, or a combination of C₄F₈ and CH₂F₂ (column 6, lines 44-52).). Hence, replacing Chu's C₄F₈ with Kuehne's C₄F₆ reads on an etchant gas composition consisting essentially of: a carrier gas; C₄F₆; CH₂F₂; and CHF₃.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu by substituting C₄F₈ for C₄F₆ as taught by Kuehne for the purpose of selectively etching a silicon oxide layer relative to a silicon nitride layer (column 6, lines 55-60).

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6. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) in view of Kuehne ('605 B1), as applied to claim 6, above, and further in view of Kim ('109).

Chu in view of Kuehne differs in failing to teach the etchant composition comprises the carrier gas that is selected from the group consisting of argon, helium, and xenon, **in claim 4** and argon **in claim 10**.

Kim teaches an etchant comprising a fluorocarbon and oxygen with a flow of an inactive diluent gas such as argon is well known for etching holes in oxide with high aspect ratios, often with a relatively high selectivity to nitride (column 4, lines 43-46).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu in view of Kuehne by employing an etchant that contains oxygen in additional to a fluorocarbon gas and diluent gas, as taught by Kim for the purpose of selectively etching an oxide layer relative to a nitride layer (column 4, lines 43-46).

7. Claims 68 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) and Kuehne ('605 B1) in view of Kim ('109 B1), as applied to claim 6, above, and further in view of Fayfield ('481).

Chu and Kuehne differs in failing to teach the carrier gas comprises helium, **in claim 68** and xenon, **in claim 72**.

Fayfield teaches, " . . . other carrier gases inert to the etching reaction may also be used, for instance the noble gases helium, neon, argon, krypton or xenon (column 6, lines 17-19).

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It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu and Kuehne in view of Kim by replacing the carrier gas with either argon, helium, or xenon, as taught by Fayfield for the purpose of diluting the reactive (etchant) gases.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) in view of Kuehne ('605 B1).

Chu teaches an etchant gas composition comprising:

an inert gas (same as carrier gas), (column 6, lines 44-48);

C_4F_8 , (column 6, lines 55);

CH_2F_2 (column 6, lines 55); and

a gas selected from the group consisting of CHF_3 , CF_4 , and mixtures thereof (column 6, line 44-45).

Chu differs in teaching C_4F_6 .

Kuehne teaches other suitable gases can be substituted for the C_4F_8 , include (for example and without limitation) C_5F_8 , C_4F_6 , or a combination of C_4F_8 and CH_2F_2 (column 6, lines 44-52).). Hence, replacing Chu's C_4F_8 with Kuehne's C_4F_6 reads on an etchant gas composition consisting essentially of: a carrier gas; C_4F_6 ; CH_2F_2 ; and CF_4 .

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu by substituting C_4F_8 for C_4F_6 as taught by Kuehne for the purpose of selectively etching a silicon oxide layer relative to a silicon nitride layer (column 6, lines 55-60).

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9. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) in view of Kuehne ('605 B1), as applied to claim 11, above, and further in view of Kim et al. (US 6,362,109).

Chu in view of Kuehne differs in failing to teach the etchant composition comprises the carrier gas that is selected from the group consisting of argon, helium, and xenon, **in claim 14** and argon **in claim 15**.

Kim teaches an etchant comprising a fluorocarbon and oxygen with a flow of an inactive diluent gas such as argon is well known for etching holes in oxide with high aspect ratios, often with a relatively high selectivity to nitride (column 4, lines 43-46).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu in view of Kuehne by employing an etchant that contains oxygen in additional to a fluorocarbon gas and diluent gas, as taught by Kim for the purpose of selectively etching an oxide layer relative to a nitride layer (column 4, lines 43-46).

10. Claims 69 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) and Kuehne ('605 B1) in view of Kim (109 B1), as applied to claim 11, above, and further in view of Fayfield ('481).

Chu and Kuehne in view of Kim differs in failing to teach the carrier gas comprises helium, **in claim 69** and xenon, **in claim 73**.

Fayfield teaches, "... other carrier gases inert to the etching reaction may also be used, for instance the noble gases helium, neon, argon, krypton or xenon (column 6, lines 17-19).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu and Kuehne in view of Kim by replacing the carrier gas with either argon, helium, or xenon, as taught by Fayfield for the purpose of diluting the reactive (etchant) gases.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over ('320) in view of Kuehne ('605 B1).

Chu teaches an etchant gas composition comprising:

an inert gas (same as carrier gas), (column 6, lines 44-48);

C₄F₈, (column 6, lines 55);

CH₂F₂ (column 6, lines 55); and

a gas selected from the group consisting of CHF₃, CF₄, and mixtures thereof (column 6, line 44-45). Chu mixture thereof reads on CHF₃ and CF₄.

Chu differs in teaching C₄F₆.

Kuehne teaches other suitable gases can be substituted for the C₄F₈, include (for example and without limitation) C₅F₈, C₄F₆, or a combination of C₄F₈ and CH₂F₂ (column 6, lines 44-52).). Hence, replacing Chu's C₄F₈ with Kuehne's C₄F₆ reads on an etchant gas composition consisting essentially of: a carrier gas; C₄F₆; CH₂F₂; CHF₃; and CF₄.

12. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) in view of Kuehne ('605 B1), as applied to claim 16, above, and further in view of Kim et al. (US 6,362,109).

Chu in view of Kuehne differs in failing to teach the etchant composition comprises the carrier gas that is selected from the group consisting of argon, helium, and xenon, **in claim 19** and argon, **in claim 20**.

Kim teaches an etchant comprising a fluorocarbon and oxygen with a flow of an inactive diluent gas such as argon is well known for etching holes in oxide with high aspect ratios, often with a relatively high selectivity to nitride (column 4, lines 43-46).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu in view of Kuehne by employing an etchant that contains oxygen in addition to a fluorocarbon gas and diluent gas, as taught by Kim for the purpose of selectively etching an oxide layer relative to a nitride layer (column 4, lines 43-46).

13. Claims 70 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu ('320) in view of Kuehne ('605 B1), as applied to claim 16, above, and further in view of Fayfield ('481).

Chu and Kuehne in view of Kim differs in failing to teach the carrier gas comprises argon, **in claim 70** and xenon, **in claim 74**.

Fayfield teaches, "... other carrier gases inert to the etching reaction may also be used, for instance the noble gases helium, neon, argon, krypton or xenon (column 6, lines 17-19).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Chu and Kuehne in

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view Kim of by replacing the carrier gas with either argon, helium, or xenon, as taught by Fayfield for the purpose of diluting the reactive gases.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers


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for the organization where this application or proceeding is assigned are 703-872-9310
for regular communications and 703-872-9311 for After Final communications.

ltue
February 20, 2003


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